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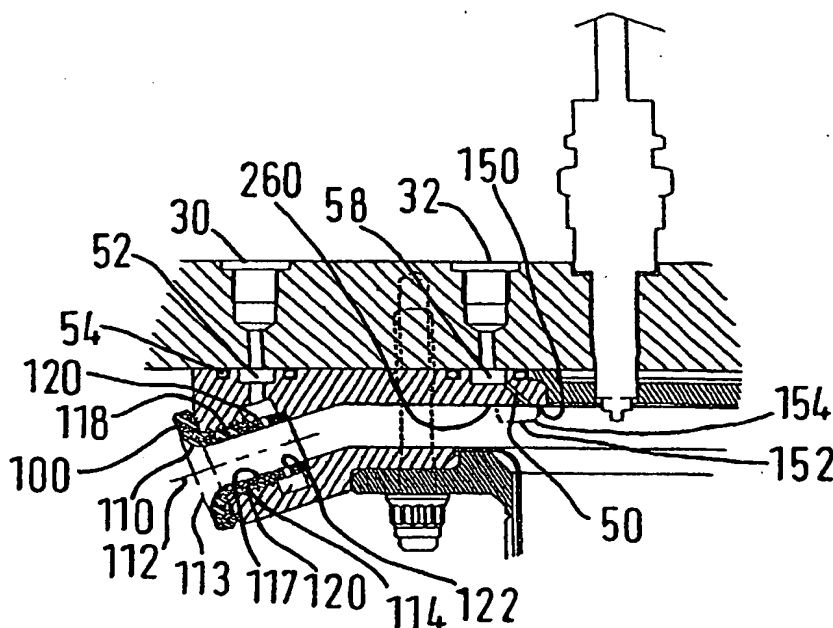
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(54) Title: A COMBUSTION DEVICE



(57) Abstract: A combustor (1) has a swirler (22). The swirler has mixing channels (40), the mixing channels having a height/width aspect ratio of less than (2). A secondary fuel inlet (32) is located downstream of mixing channel (40) and may be in a zone (65) of separated flow. Primary fuel admission may be through a threaded or push fit circular movable plug (100). The plug (100) may be conveniently removed for calibration purposes and may have a bell-mouthed entrance.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 F23R3/28

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 F23R F23D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 058 062 A (NUOVO PIGNONE SPA) 6 December 2000 (2000-12-06)	1-4,7, 11,12, 31-34, 36,54, 66-68,70
Y	paragraphs [0006], [0008] figure 1	5,6,20, 22-29, 35,37, 38, 41-46, 55-58
Y	US 5 628 184 A (SANTOS ROLANDO R) 13 May 1997 (1997-05-13) figures 6-9 column 7, line 49 - line 65	5,6
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
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- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

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- "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

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PCT/GB 03/05624

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 1 260 768 A (ROLLS ROYCE CANADA LTD ;ROLLS ROYCE PLC (GB)) 27 November 2002 (2002-11-27)	20,55-58
A	paragraph [0033] paragraph [0071] figures 1,2	8-10
Y	EP 0 957 311 A (ALSTOM GAS TURBINES LTD) 17 November 1999 (1999-11-17)	22-29, 35,37, 38, 42-46,57
	figures 1,2 paragraphs [0014], [0015]	
Y	FR 2 824 625 A (INST FRANCAIS DU PETROL) 15 November 2002 (2002-11-15) figure 6 page 12, line 15 - page 13, line 3	41
X	GB 2 012 415 A (SECR DEFENCE) 25 July 1979 (1979-07-25)	1,2,7, 11,12, 31,66-68
	figures 1-3 page 1, line 73 - line 94 page 2, line 66 - line 69	
X	US 6 070 410 A (DEAN ANTHONY JOHN) 6 June 2000 (2000-06-06)	1,2,7, 11,31, 41,54, 66-68
	figures 2,4 column 3, line 1 - line 6 column 3, line 55 - column 4, line 2 column 4, line 19 - line 26	
X	US 6 301 899 B1 (DEAN ANTHONY JOHN ET AL) 16 October 2001 (2001-10-16)	1-4,7, 11,12, 31,44, 54,58, 66-68
	column 3, line 9 - line 31 figure 1	
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	figure 2 column 3, line 22 - line 28 column 4, line 37 - line 52	
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INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 03/05624

C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to classification No.
A	DE 39 13 124 A (ASEA BROWN BOVERI) 14 December 1989 (1989-12-14) column 3, line 47 - line 53 column 4, line 7 - line 10 figures 1,2 -----	1
E	US 2004/011021 A1 (INOUE TSUTOMU ET AL) 22 January 2004 (2004-01-22) figures 2,8,9 paragraphs [0047] - [0053] -----	1-4, 6,7, 11,12, 31,44, 54,66-68
P,X	US 2003/172655 A1 (SMITH DUANE ET AL) 18 September 2003 (2003-09-18) figures 3,8 paragraph [0029] paragraph [0031] paragraph [0038] -----	1-4, 7, 11,12, 31,44, 54,66-68

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB 03/0 5624

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-12, 20, 22-29, 31-46, 54-58, 66-68, 70

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-12,20,22-29,31-46,54-58,66-68,70

A fuel insert for an air/fuel mixing channel.

2. claims: 13-19,21,30,50,51,71-78

A mixing channel with a specific geometric configuration

3. claims: 47-49,52,53

A fuel/air mixing apparatus with primary and secondary fuel outlets

4. claims: 59-65,69

Calibrating a fuel inlet before installing it on the fuel/air mixer.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 03/05624

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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